BOEING LTU
RESPONSE TO COMMENTS

Responses in italics are provided for specific comments or portions of comments, which are both referenced by section, paragraph, and sentence, and reproduced for clarity.

General Comment. It is emphasized that the Waste Discharge Requirements (WDRs) pertain to a specific scope of work that is required to biotreat sediment and soil from the Happy Valley and Building 359 Areas of Concern pursuant to interim measures that were implemented to control perchlorate in surface water. The context of the comments that are provided by the Committee to Bridge the Gap are sometimes inconsistent with the purpose of the WDRs, and the objective and scope of this interim measures program.

Background Section, Paragraph 4, Sentence 10. "By narrowing the perchlorate discussion to just Building 359 and Happy Valley, one is inaccurately describing the problem and inadequately addressing its remediation."

These interim measures are specifically focused on the Happy Valley and Building 359 areas for the intended purpose of removing perchlorate from sediment, and soil so that surface water contacting these materials will achieve surface water quality objectives. Other occurrences of perchlorate at SSFL are not a part of these interim measures.

Background Section, Paragraph 5, Sentence 1. "Boeing-Rocketdyne proposes to treat some of its perchlorate-contaminated soil with an experimental technique of bioremediation."

The biotreatment technique proposed for treating perchlorate-contaminated soil is not experimental, but rather tried and proven on a number of sites in the United States, including in California. The technique is a simple combination of composting and in-situ bioremediation, where a carbon source and water are applied to the soils to be treated, and the indigenous bacteria are stimulated to grow, consuming the resident perchlorate in the process. Successful applications of the bioremediation technique are documented in reports prepared for applications at the Aerojet facility in Sacramento, California (GeoSyntec Consultants, 2002), the Longhorn Army Ammunition Plant in Marshall, Texas (Schnoor et. al., 2002), and the United Technologies Corporation facility in San Jose, California (GeoSyntec Consultants, 2000).

II. Comments on the Draft WDRs, Paragraph 7, Sentences 3-5. "We are concerned that the excavated soils do not represent the full range of contaminated soil that should be excavated and treated. We are also concerned that contaminated rock is not being dealt with in this approach. We have seen no data – and hereby request that we be provided

them – for the claim that the soil from the Borrow Pit, "has been determined to contain clean soil."

The interim measures are designed specifically to mitigate perchlorate contained in soil and sediment that was excavated from the Happy Valley Drainage and transported to the Building 359 area to be biotreated ex-situ along with in-situ soil present at the Building 359, 376, and 316 areas. The objective of the interim measures is to remove perchlorate from these soils and sediments so that surface water contacting these materials does not contain perchlorate at concentrations that exceed surface water quality objectives.

Although bedrock that contains perchlorate is not part of this WDR, bedrock was removed from the Happy Valley Drainage by chipping, scraping, and excavation based on analytical test results, and disposed of off-site in accordance with waste disposal regulations.

The Soil Borrow Area was used as clean backfill during the implementation of the interim measures. DTSC approved the use of this soil for the purposes of backfilling excavations and, in this particular situation, to backfill excavations resulting from the removal of soil in and adjacent to the Happy Valley Drainage.

II. Comments on the Draft WDRs, Paragraph 7, Sentences 9-11. "Additionally, we are very troubled by the issues raised by the sentence saying the soils are protected and covered with plastic sheeting "to prevent impact" to water resources from infiltrating rainwater. No liner was placed underneath the huge piles of contaminated soil; and the Boeing plan is to add water to the piles to purportedly help the bioremediation along. The risk is significant that this will leach perchlorate out of the contaminated soil and cause it to migrate."

The biotreatment technique relies on cultivating soil conditions that are conducive to the growth of indigenous bacteria so that the microbial population flourishes, feeding on perchlorate and rendering it to water, carbon dioxide, and chloride ion. Cultivating soil conditions that are appropriate for microbial growth involves controlling the moisture and carbon source content of the soil. Covering the soil with plastic sheeting improves the ability to control the soil moisture content by reducing evaporation during the hot summer months (i.e., retaining added moisture), and by preventing infiltration of uncontrolled amounts of rainwater during periods of wet weather. By controlling the amount of water that is added to the soil, it is possible to control the depth to which water infiltrates into the subsurface. The target depth for the infiltration of water and amendments for the in-situ treatment of perchlorate in soils at the Building 359 area is approximately 3 feet. Although some perchlorate may migrate from the overlying soils to the treatment depth of approximately 3 feet, the microbial population would then reduce it to water, carbon dioxide, and chloride ion. A liner on the surface of the in-situ soils would effectively prevent the in-situ biotreatment process from being implemented, reducing the effectiveness of the interim measure.

II. Comments on the Draft WDRs, Paragraph 16, Sentences 2-4. "The perchlorate monitoring method has very high detection limits, can readily miss areas of significant remaining contamination, and is biased to throwing out what Boeing describes as "false positives" while not protecting against false negatives. We think it likely significant perchlorate will remain in portions of the composted piles undetected; the "acceptable" levels of remaining contamination are much too high. Much of the contaminated soil seems not to have been excavated."

The perchlorate reporting limit for the analytical method will be 4 ppb, which is the industry standard. All samples will report the associated percent moisture to provide a consistent basis for assessment of contamination. Performance monitoring will include the collection of 92 discrete soil samples from the biotreatment zone, which is adequate to detect significant residual perchlorate contamination, if present. Clear guidelines are in place to ensure that the analytical results will be reliable, including methods for checking for both false negative and positive results. Boeing excavated approximately 8,500 cubic yards of soil, sediment, and rock that contained perchlorate during this interim measure. Approximately 8,000 cubic yards of soil and sediment that contain perchlorate will be biotreated ex-situ pursuant to these WDRs. An additional 10,000 cubic yards of soil that contains perchlorate will be biotreated in-situ pursuant to these WDRs. Approximately 500 cubic yards of rock that contained perchlorate was disposed of off-site at a licensed landfill.

II. Comments on the Draft WDRs, Paragraph 17, Sentence 2. **"**Given that only once in the last several years has the discharge at that point been over 6 ppb – before the remediation – one is setting up a situation where Boeing could do virtually no successful bioremediation and still be let off from cleaning up the contamination because of this lax proposed standard."

Despite the low concentrations of perchlorate detected in surface water in the Happy Valley Drainage, a very conservative approach has been taken by removing thousands of cubic yards of soil, sediment, and bedrock from the drainage to achieve surface water quality goals, and further reduce already very low concentrations of perchlorate.

II. Comments on the Draft WDRs, Paragraph 18, Sentences 1-2. "Bioremediating only down to a depth of 3 feet at Bldgs 359 and 376 and only 1 foot at Bldg 316 is troubling. Contamination is likely to extend considerably deeper."

The objective of the interim measure is to mitigate the pathway in which perchlorate in soil and sediment could potentially contact surface water and migrate off-site from the Happy Valley and Building 359 areas of concern. The scope of the in-situ biotreatment portion of the interim measure is thus constrained to the upper 3 feet of the soil horizon because this is conservatively that portion of the soil column that could potentially contact surface water. The upper 2 feet of the soil horizon at the Building 316 area was

excavated and disposed of off-site at a licensed landfill because of its metals content. Biotreatment of an additional 1 foot layer of soil in-situ at the Building 316 area yields a total remediation depth of 3 feet, consistent with the remediation depths planned for the other sites subject to these interim measures.

II. Comments on the Draft WDRs, Paragraph 18, Sentence 3. "Furthermore, the very process proposed – irrigating the contaminated soil so as to get the food medium to percolate into the soil profile – is likely to cause contamination to migrate further into the profile while being ineffective at getting the proper conditions to exist uniformly in the profile and thus having the effect in part of accelerating migration."

The in-situ biotreatment process proposed may result in the migration of some perchlorate deeper into the soil column as the amended water infiltrates to the target biotreatment depth of approximately 3 feet. Some heterogeneity in soil properties is also expected to occur across the sites, resulting in some variability in the thickness of the active biotreatment zone. For these reasons, the depth of the wetting front will be monitored across the site by collecting soil samples with a hand auger for water content analysis, and by visually observing the location of the wetting front by logging the borings. The amount of water distributed to the treatment zone may be adjusted, if necessary, as indicated by monitoring. The in-situ biotreatment process proposed is not overly sensitive to the water content, and biotreatment should occur to the total depth of penetration of the amended water. Thus, any perchlorate that dissolves in the amended water and infiltrates deeper into the biotreatment zone will be reduced to water, carbon dioxide, and chloride ion.

II. Comments on the Draft WDRs, Paragraph 18, Sentences 4-5. "The last sentence in this paragraph should be rewritten to indicate that it is hoped it will reduce "some of" the perchlorate. The technique even if it operates as advertised is only designed to reduce concentrations and, particularly in in-situ applications, significant concentrations are expected to remain."

Bench-scale testing of the biotreatment process proposed for use in these interim measures achieved reductions in perchlorate concentrations to below the method detection limits (EPA Method 314.0) within two weeks for all the alternative amendments tested. The biotreatment process proposed in these interim measures involves application of water and amendments to a three-foot-thick in-situ biotreatment zone, the upper 6 to 12 inches of which will be mixed by tilling with agricultural equipment. Overlaying the in-situ biotreatment layer will be an ex-situ biotreatment zone that will be constructed in 1 to 2 foot thick lifts of soil that will be mixed with agricultural tilling equipment. Performance monitoring periods will be of 6 weeks duration. The proposed biotreatment process will thus involve soil that is fairly well mixed, with more than enough time to effectively biotreat the targeted soils. Considering that the process will be monitored and has been demonstrated to work, it should achieve fairly complete and uniform biotreatment of the targeted soils.

II. Comments on the Draft WDRs, Paragraph 19, Sentence 3. "It is not possible to prevent that water from percolating to lower depths in the vadose zone or the underlying groundwater."

The depth to which water percolates into the vadose zone can be controlled by controlling the amount of water that is applied to the treatment area. The biotreatment program is anticipated to begin and end during the dry weather season, and after a measured amount of water is applied to the treatment area, the soil moisture content and the depth of the wetting front will be monitored. After the wetting front advances to the desired treatment depth of approximately 3 feet, the pile will be covered with plastic to reduce evaporation, and prevent additional water from entering the biotreatment zone via a storm event. Note that the depth of the target biotreatment zone is only 3 feet, and the depth to groundwater underlying the Building 359 area is approximately 160 feet.

II. Comments on the Draft WDRs, Paragraph 19, Sentences 4-6. "Saying that "soils will not be *oversaturated*" (emphasis added) does not mean that water will not be allowed to percolate downward. The latter is impossible if you are watering the contaminated soil. Gravity has not been repealed, and the water in the soil, and any water added to it, tend to percolate downward."

The biotreatment process relies on amended water percolating downward to a depth of approximately 3 feet to cultivate conditions conducive to microbial growth. The approximate depth of infiltration will be controlled, however, by controlling the amount of water applied to the surface of the treatment area. At some shallow depth below the treatment zone the soil moisture will be at the specific retention of the soil. The specific retention is defined as "the measure of water retained in the soil against gravity by capillarity and hygroscopic forces" (Batu 1998).

II. Comments on the Draft WDRs, Paragraph 20, Sentences 1-2. "This paragraph doesn't analyze the issues associated with field capacity and the amount of moisture they intend to add to the soil, just says that it has been calculated. Moisture movement can occur below field capacity, and it appears very difficult in the real world to perfectly maintain field capacity throughout the contaminated profile without some portions being higher and others lower."

It is difficult to perfectly maintain field capacity throughout a targeted zone, even one that is only 3 feet thick. For the proposed biotreatment process, however, it is not necessary to precisely maintain the upper 3 feet of the vadose zone at field capacity. It is only necessary to maintain approximately the upper 3 feet of the vadose zone at a soil moisture content that is near the field capacity. The soil moisture monitoring program will be used to manage the soil moisture content of the treatment zone within reasonable limits.

II. Comments on the Draft WDRs, Paragraph 20, Sentence 3. "The prospect of this treatment method of actually mobilizing the contaminants is inadequately analyzed."

Perchlorate is extremely soluble, and it is anticipated that some perchlorate may dissolve in the amended water and infiltrate deeper into the biotreatment zone. It is also anticipated that this perchlorate will biodegrade by application of this process.

II. Comments on the Draft WDRs, Paragraph 21, Sentences 1-3. "This merely describes a moisture-sampling program, but does not analyze whether the sampling program would be effective in stopping migration of contaminants. Again, the focus is too heavy on saturated-phase migration, whereas the amount of water they intend to add seems quite sufficient to cause downward migration of the contaminants. It is hard for this not to be the case – if you are going to get enough water throughout the contaminated profile it isn't possible for it to stop where the contamination supposedly ends."

The scope and objective of this interim measure is to biotreat the perchlorate contained in approximately the upper 3 feet of the vadose zone, regardless of the actual distribution of contaminants. The biotreatment process relies on the infiltration of amended water to cultivate conditions conducive to biodegradation in this shallow soil horizon. It is emphasized that this is an approximate thickness, and the actual biotreatment zone will be somewhat variable. However, perchlorate contained within the biotreatment zone should readily biodegrade regardless of the actual depth of infiltration of the amended water. In other words, the fact that water may migrate down does not mean that perchlorate will do so because the perchlorate will have biodegraded.

II. Comments on the Draft WDRs, Paragraph 22, Sentences 1-2. "The first phrase should be removed – it is *not* "unlikely that perchlorate could migrate to the water table." It is empirically proven that it already has."

It is unlikely that perchlorate could migrate to the water table <u>because of</u> the biotreatment process proposed for this interim measure. The biotreatment process as proposed is a controlled and monitored process. Only enough water will be added to deliver amendments to approximately the upper 3 feet of the soil horizon, and groundwater occurs at a depth of approximately 160 feet. In other words, many times more water would have to be applied to the treatment area than is proposed to overcome the specific retention of an approximately 160 foot thick soil mass, and reach the water table. The perchlorate that occurs in groundwater underlying the site migrated under uncontrolled conditions unrelated to the proposed biotreatment process, and over a much longer duration, perhaps decades.

II. Comments on the Draft WDRs, Paragraph 22, Sentence 7. "The potassium bromide tracer they propose to use for monitoring – of the perchlorate – is unlikely to travel to groundwater in the time periods they contemplate for monitoring. Note that Boeing proposed to end quarterly monitoring after just 4 samples, i.e., one year."

It is agreed that the tracer, potassium bromide, is unlikely to travel to groundwater within the one-year monitoring period. Likewise, neither will perchlorate migrate to groundwater via the proposed biotreatment process.

II. Comments on the Draft WDRs, Paragraph 22, Sentence 8-9. "But even if the monitoring picks up the potassium bromide or perchlorate during the period in question – it will be too late. The project will be over, and the enhanced perchlorate migration will have already occurred."

The biotreatment process will effectively biodegrade the perchlorate within the treatment zone, including perchlorate that dissolves into the amended water and infiltrates deeper within the treatment zone. The potassium bromide tracer is a conservative tracer that will be unaffected by the biotreatment process.

II. Comments on the Draft WDRs, Paragraph 23, Sentences 1-2. "We are skeptical that the bioremediation will work as Boeing says – i.e., decrease perchlorate concentrations to less than 4 ppb in the soil. We think it is unlikely that bioremediation will be uniform, particularly in in-situ applications; significant portions of the soil are likely to remain with elevated concentrations, and post-remediation sampling appears inadequate to catch this."

The bench-scale test successfully reduced the perchlorate concentrations in soil to less than 4 µg/kg within two weeks for all the alternative amendments tested. There is a growing body of work at other sites across the country where similar biotreatment successes have been realized. In-situ applications do pose greater challenges in cultivating subsurface conditions that are uniformly conducive to biodegradation. However, the proposed application involves only the upper 3 feet of the soil horizon, and much of the upper foot will be tilled, effectively mixing the soils and amendments. Given that the biotreatment process has been demonstrated to be effective, and that only the upper 3 feet of soil is targeted for treatment, it is reasonable to expect fairly uniform and complete biotreatment throughout the treatment zone.

II. Comments on the Draft WDRs, Paragraph 23, Sentences 4-6. "But we are most concerned about the 4 ppb number itself. The draft WDRs as currently written indicate this is 4 ppb of soil – i.e., 4 parts of perchlorate per billion parts of soil. Because the relevant standard (e.g., detection limit, Action Level) is measured in parts per billion of water, this apparent shift of units is troubling, as discussed below, and should not be permitted."

The analytical testing performed during the Happy Valley Interim Measures, and the analytical testing that will be performed for the biotreatment program, follows industry standards and is in accordance with regulatory guidelines and requirements. As a means of maximizing consistency, since high quantities of soil pore moisture are not typically present in near surface soils in environments such as the SSFL, the standard of collecting soil samples and obtaining a "leachate" sample from those soils has been established. Percent soil moisture will also be measured and reported for each soil sample to provide a consistent basis for evaluating the data. The "leachate" sample methodology is relatively sensitive for detecting low concentrations of perchlorate in soil due to the high solubility of perchlorate. DTSC has approved the use of the "leachate" sample methodology as specified in the Interim Measures workplan..

II. Comments on the Draft WDRs, Paragraph 23, Sentences 9-11. "Note also that the detection method proposed is, as we understand it, to pour a large volume of distilled water into a soil sample, remove that water, and then measure it. Thus, a liter of water could be added to a liter of soil (which only contained a few milliliters of soil pore water contaminated with perchlorate), diluting the contaminated soil water by something like twenty to one. Using a detection level of 4 ppb in the diluted sample water would mean Rocketdyne could claim the reading is "non-detect" even when the actual concentration in the soil water was nearly 100 ppb."

Large volumes of distilled water are not poured into a soil sample causing dilution of the soil pore water contaminated with perchlorate. A 1:1 ratio, using dry weight of the sediment and distilled water is used. The intent is not to dilute soil pore water, but rather to facilitate the perchlorate, which is highly soluble, to go into solution. The liquid solution is then analyzed for perchlorate. This methodology was used during the Happy Valley Interim Measures, and has been acceptable to DTSC.

II. Comments on the Draft WDRs, Paragraph 23, Sentence 12. "The units employed should be ppb of soil moisture (parts of perchlorate per billion parts of soil water, prior to the addition of any water to the sample, either in-situ or after sampling)."

All leachate samples will be reported in ppb (ug/L). This is a common practice when a leachate is prepared either in the field or in the laboratory setting. The leachate represents the amount of contaminant available to move from soil to water within a sample, and is inclusive of the perchlorate salts precipitated in the soil, the perchlorate salts partially bound by the soil, and the perchlorate ions in the pore water associated with the soil. The moisture content of the soil is also reported to provide a consistent basis for comparison.

II. Comments on the Draft WDRs, Paragraph 23, Sentences 13-14. "Finally, no actual standard is included in the draft WDRs, whatever the units—merely an assertion by

Boeing that it thinks it will reach 4 ppb of soil. This creates the potential for Boeing to declare success and do no further remediation no matter how poorly the technique may work."

The proposed biotreatment process that will be implemented has been successfully applied to remove perchlorate from soils at other sites. Bench-scale biotreatment studies using soil from the Building 359 area indicate that perchlorate can be reduced to less than 4 µg/kg within two weeks. However, given the quantity of soils and the differences between bench-scale and field-scale applications, additional time has been conservatively provided for in the schedule to complete the biotreatment process (up to 6 months). The DTSC is providing regulatory oversight, and will be involved in the evaluation and determination of whether the soils and sediments have been successfully biotreated.

II. Comments on the Draft WDRs, Paragraph 25, Sentence 3. "It is indicated CMA will penetrate "the full 3 feet treatment depth with the wetting front," but no discussion is included as to whether it may in fact penetrate further and help perchlorate move."

Soils at the site contain a fairly high clay content, and for this reason, the permeability of the soils is not high. CMA has been shown in one study to enhance the permeability of clayey soils, and this is perceived to be a benefit for the Building 359 area sites. Regardless of the use of CMA or another amendment, soil moisture monitoring and visual observations in hand auger borings will be used to evaluate the actual depth of the wetting front. As the wetting front will contain amendments, biotreatment of perchlorate should occur to the total depth of the wetting front.

II. Comments on the Draft WDRs, Paragraph 27, Sentence 1. "Ex-situ soil treatment should be performed by spreading the soil in one- to two-foot thick lifts which are placed on top of plastic liners to prevent migration of the perchlorate out of the soil being treated to the uncontaminated soil below and nearby."

The interim measure involves ex-situ treatment of soil that is spread directly on top of in-situ soil that contains perchlorate, and will in fact be biotreated using a similar treatment approach. A liner to prevent migration of perchlorate out of the ex-situ soil to the uncontaminated soil below is not necessary because the in-situ soils of the treatment area are already contaminated with perchlorate, and are targeted for treatment. There are no locations where soil contaminated with perchlorate is to be spread over soil that does not already contain perchlorate.

II. Comments on the Draft WDRs, Paragraph A3, Sentence 2. "There should be a requirement that all ex-situ treatment be conducted with thick plastic liners underneath the soil being treated to prevent perchlorate migration."

Placement of liners are not warranted beneath the ex-situ soils that are to be treated at the Building 359 and 316 areas for two reasons: 1) the underlying in-situ soils already contain perchlorate; and 2) the proposed process relies on the infiltration of water and amendments through the entire soil mass to be treated. A liner would prevent the distribution of amended water via infiltration through the entire mass of soil to be treated by providing a barrier at the interface of the ex-situ and in-situ soil masses.

II. Comments on the Draft WDRs, Paragraph A5, Sentences 1-2. "We are puzzled as to why the maximum depth of the treatment zone shall not exceed six feet from the surface, if Boeing claims to only be treating down 3 feet. This may create the potential for them to say they are permitted to have perchlorate migrate an additional 3 feet below the planned treated zone."

The planned biotreatment zone is approximately 3 feet from the initial in-situ soil surface. Note that this is an approximate biotreatment target depth, and that there will be some variability. The treatment zone will likely extend a little deeper in some locations than others, but it is not expected to exceed 6 feet. The migration of perchlorate within the biotreatment zone should not be a factor because it will be biodegraded regardless of the depth within the biotreatment zone that it resides.

II. Comments on the Draft WDRs, Paragraph B2, Sentences 1. "This provision is also insufficiently precise, setting the threshold as when moisture from the soil treatment may "impact groundwater."

Moisture from the soil biotreatment process is not expected to "impact groundwater." Controls on the amount of water applied to the treatment area, coupled with the soil moisture monitoring program, should prevent groundwater impacts associated with this program from occurring. It is emphasized that the biotreatment zone includes only the upper 3 feet of the in-situ soil mass, and that the approximate depth to groundwater underlying the biotreatment zone is approximately 160 feet. An extraordinarily large volume of water would have to be applied to the treatment area just to satisfy the specific retention of the vadose zone soil mass underlying the treatment area.

II. Comments on the Draft Monitoring and Reporting Program, Section II.A. "We question whether sampling only 12 spots and at 2 depths is anywhere near sufficient. We also note that neither the locations nor the depths are specified, giving the discharger a great deal of potential leeway to bias the sample locations."

For clarification purposes, this sampling scenario was proposed for moisture monitoring in the biotreatment soils, not for perchlorate biodegradation monitoring. This approach will be sufficient to evaluate the general distribution of moisture in the soils. To be accurate, a total of 24 locations will be evaluated for moisture. Specifically, two soil cores will be collected from two locations within the Building 316 area for moisture

content and bulk density analysis from a depth of 2 to 3 feet below ground surface (bgs); two soil samples will be collected from two locations within the Building 376 area from a depth of 2-3 feet; four soil samples will be collected from two locations within each of the four quadrants of the Building 359 area from depths of 2 to 3 feet, and 5 to 6 feet; and 12 locations will be qualitatively evaluated for moisture content through visual inspection. These 12 locations will be biased towards locations in the southern portion of the biotreatment area where bedrock occurs at a shallower depth.

Furthermore, ex-situ soils that will be spread over the in-situ treatment area will likely have been fairly well-mixed as a result of the excavation, transportation, and tilling processes, resulting in a more uniform treatment area. This will increase the representativeness of the monitoring program.

II. Comments on the Draft Monitoring and Reporting Program, Section II.B., Sentences 1-3. "We are deeply concerned about the very small number of samples required to confirm treatment effectiveness. Two composited samples from the Building 316 area, 1 from the Building 376 area, and only 5 from each of the four quadrants in the Building 359 area. Furthermore, we see no requirements for sampling for the ex-situ treatment piles of excavated soils (e.g., Happy Valley drainage), and no requirements for sampling areas not treated to see if significant perchlorate contamination remains in non-treated locations."

Biotreatment effectiveness will be evaluated by collecting a total of 92 discrete soil samples from both in-situ and ex-situ soils for perchlorate analysis (EPA Test Method 314.0). A random soil sampling approach will be used, in concurrence with DTSC, to minimize the potential for biased soil sampling. The random soil sampling process will use a horizontal and vertical grid that incorporates the depth of the entire soil mass, inclusive of ex-situ and in-situ soils, for each portion of the treatment area to be sampled. These samples will be composited, as is standard industry practice, for stockpiles of this size. In this manner, representative samples will be obtained from the entire treatment area, including both in-situ and ex-situ soils. Additional investigation of the distribution of perchlorate in other areas at the site is beyond the scope of this interim measure.